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The relationship between delayed primary wing feather moult and local harvest rates of adult female Mallards in Manitoba, 1982–1984

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Abstract

Reward bands were placed on adult female Mallards *Anas platyrhynchos* on the Delta Marsh in southern Manitoba from 1982 to 1984. Evidence of primary wing feather moult was recorded for each individual, and patterns of direct band recoveries were examined. Although sample sizes were small, the data suggest that late moulting females (probably the most persistent nesters) are killed locally at a higher rate than females that have completed the moult well before hunting season opens. Delayed hunting season opening dates may therefore protect breeding females. Thus, a delay of hunting season, coupled with improved habitat to increase nest success, may be a useful management tool to achieve increases in Mallard population sizes.

Introduction

Over the past 20 years, numbers of Mallards *Anas platyrhynchos* have declined to low levels on the Canadian prairies (Anonymous 1985), owing to the combined effects of persistent drought, low recruitment, and, possibly, high harvest rates. The factors governing harvests on the breeding grounds are poorly understood. Hochbaum (1944, 1947) suggested that local overharvest of adult females of some duck species may impair production in subsequent years and could lead to a depletion of breeding stock. He implied that early hunting season openings (early to mid-September), combined with late hatches, delayed moult, and poor wing feather development, could make females more vulnerable to hunters and lead to higher harvests and "burned out" marshes. Local breeding birds with high levels of fidelity would be killed and the breeding population depleted (Hochbaum 1944, 1947). Hochbaum and Walters (1984) suggested that the foraging requirements of females that successfully reared broods may be greater because of possible behavioural and physiological stresses brought on by moult, and that these birds, if in poor condition, may be more vulnerable to hunters using decoys. Their poor condition may be the result of the birds not being capable of sustained flight or being unable to make traditional foraging flights to grain fields where they eat grains used in premigratory fattening (Hochbaum 1944; Bossenmaier and Marshall 1958).

Clark et al. (1988) suggested that later hatching of Mallard nests due to high levels of predation and renesting, coupled with delayed wing feather moult, might lead to higher harvest rates of adult females. This may be particularly true where overwater hunting is widespread. Caswell et al. (1985) suggested that delayed opening of the hunting season increased survival rates of adult female Mallards in Manitoba, as a result of a reduction in local harvests.

For this study, we examined the relationship between harvest rate and wing feather moult in adult female Mallards in Manitoba to help us gauge the effectiveness of management programs designed to reduce local hunting pressure on late-nesting ducks.

Study area and methods

Adult female Mallards (more than one year old) were banded on the Delta Marsh in southern Manitoba between 1 August and 10 September, from 1982 through 1984. Age was determined by feather characteristics and cloacal examination (Hochbaum 1942). Females were banded with standard aluminum bands and a $10 reward band. Bands were supplied by the Patuxent Research Center of the U.S. Fish and Wildlife Service.

The presence and extent of wing feather moult were recorded for each individual female. Primary wing feathers were examined by extending the wing. The birds were considered *nonmoulted* if their primaries were ragged and faded with sharp tips; *in moult* if their wing feathers were absent or in the blood quill stage; and *moulted* if their wing feathers were new with round edges and tips. In the analysis, the categories of in moult and nonmoulted were combined into a single nonmoulted category.

All banding was accomplished on a traditional duck loafing site in a private hunting club. Birds were trapped in weld wire traps baited with barley. Traps were checked once daily.

The Delta Marsh is a large marsh (35 000 ha) consisting of bays, creeks, sloughs, and meadows and was formerly a favoured breeding and staging site for Mallards (Hochbaum 1944). More recently, fall populations have declined (Hochbaum and Walters 1984). The Delta Marsh is one of the most popular duck hunting

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areas in western Canada and is used by hunters shooting over decoys. Overwater hunting is traditional in Manitoba on large marshes such as Delta.

Hunting during the study period opened during the third week of September, normally around 21 September. Hunter effort was not monitored during the study, but we assumed that it was relatively constant across the years, as indicated by Manitoba permit sales and hunter interviews (Anonymous 1985).

Results and discussion

During the three years of banding, 403 adult female Mallards were reward-banded. We examined frequency and rate of direct band recoveries for moulted and nonmoulted birds (years pooled) and found that nonmoulted females were recovered with greater frequency and rate (Table 1; $\chi^2 = 5.94$, d.f. = 1, $P = 0.05$, adjusted for continuity; Maxwell 1961) than were females who had completed the wing moult. This implies higher harvest rates of hens that moulted late in the summer or in early fall when viewed continentally. (Direct recoveries are bands taken the first hunting season after banding.)

The frequency and rate of direct recovery of reward-banded females within Manitoba alone were higher for adult females that had not moulted than for those that had moulted (Table 1; $\chi^2 = 5.40$, d.f. = 1, $P = 0.02$, adjusted for continuity). This suggests higher local mortality of this cohort.

Outside Manitoba, the frequency and rate of recovery were not related to moult (Table 1; $\chi^2 = 0.53$, d.f. = 1, $P = 0.46$). These findings suggest equal harvest rates in both moult groups after hens leave Manitoba.

Adult females of most duck species delay the wing moult until their young are fledged (Hochbaum 1944). Our analysis supports that of Clark et al. (1988), who speculated that hens were more vulnerable to hunters when they had attempted to nest several times and moulted either late in the summer or during the onset of hunting. Adult females that had not moulted were disproportionately represented in the local kill in our study, and we suspect that this may have been to their relatively poor physical condition, which is associated with late moult. Females just regaining flight after the moult may have increased energy demands and may spend more time feeding or searching for food. Females that have renested several times and then reared late broods may be more likely to be actively in pursuit of food. These females may seek out other foraging hens and may be more vulnerable to hunters shooting over decoys, a method commonly used by hunters at the Delta Marsh (Hochbaum and Walters 1984). In contrast, hens who moulted earlier in the summer may have renewed their energy reserves prior to the hunting season and so be less vulnerable to hunters. Greenwood et al. (1986) found that Mallards shot over decoys are in poorer condition than those shot in roosts, and studies on wintering grounds in the United States suggest higher harvests of Mallards that are in poor physical condition (Hepp et al. 1986).

In Minnesota, Gilmer et al. (1977) found that brood hens that remained in the study area were more vulnerable to hunting than those that completed the wing moult (and left the breeding area) long before hunting season. By going through an early wing moult, females may enter the postbreeding and hunting seasons with higher nutrient reserves than birds that have moulted late. Some evidence suggests that ducks in good body condition are less vulnerable to hunters than those in relatively poor condition (Greenwood et al. 1986; Haramis et al. 1986; Hepp et al. 1986).

Table 1
Numbers of direct recoveries of adult female Mallards reported in Manitoba and outside Manitoba in relation to moult status

Moult Status	Inside Manitoba	Outside Manitoba	Not yet returned	Total
Moulted	1	11	174	186
Nonmoulted	9	9	199	217
Total	10	20	373	403

Management implications

The results of this study suggest that female Mallards whose wing feather moult is delayed until late in the summer (just prior to or during hunting) experience higher local mortality than those females that moult earlier. This mortality is a cause of concern, as these late-moulting birds may be the persistent renesting females; because nest predation is intense and broods are commonly hatched from renests, these may be the most productive females. Delays in the wing moult may be caused by high nest predation on the breeding grounds, which results in multiple nesting attempts (Gilmer et al. 1977). Delayed opening of hunting season may reduce hunting mortality and increase survival of late-moulting females (Caswell et al. 1985); therefore, restrictive regulations in the form of delayed hunting season openings may be invoked in breeding areas (or range) where an increase in population size is desired. Habitat management programs that improve the success of early-nesting hens and thereby reduce the need to renest would be beneficial. We suggest further banding to determine timing and pattern of dispersal of adult females from the breeding grounds. If adult females are to be protected, then harvest schemes should be geared towards the timing of moult and pattern of dispersal.

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